CALIFORNIA SEAWEEDS COLLECTED BY THE MALASPINA EXPEDITION, ESPECIALLY *PELVETIA* (FUCALES, PHAEOPHYCEAE)

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ABSTRACT

When the Malaspina expedition visited Monterey in 1791, Tadeáš Haenke collected a few seaweeds which eventually were entrusted to C. A. Agardh at Lund for study. Of 28 species listed by Agardh in 1825 for the entire itinerary of the expedition, 10 were considered new. Two additional new species were described on the basis of Haenke collections by J. G. Agardh in 1847. The provenance and taxonomic placement of some of these new species have remained uncertain. A study of Haenke's collections at Prague (PR) and in the Agardh herbarium at Lund (LD) has clarified much of this uncertainty. The only name in current use for a California seaweed that is affected by the Haenke species is *Pelvetia fastigiata* (J. Agardh) De Toni. Its type was collected on the Monterey Peninsula by David Douglas and published as *Fucus fastigiatus* J. Agardh 1841 (a later homonym), but established nomenclaturally as *Fucodium fastigiatum* J. Agardh 1848. It is referable to forma *gracilis* rather than to the biologically typical form. Haenke collected the latter, which was published as *Fucus compressus* C. Agardh 1824 (also a later homonym), but established nomenclaturally as *Fucodium compressum* J. Agardh 1848. Of the two names with equal priority, *Pelvetia compressa* (J. Agardh) De Toni is herein applied to the biologically typical populations, with f. *gracilis* recognized as a minor variant.

The first scientific expedition to reach California was led by the Count de la Péyrouse (Jean François de Galaup), who visited Monterey during the period 14–24 September 1786 (McKelvey 1955). Whether seaweeds were collected at that time will never be known, since the expedition ended in shipwreck and massacre on Vanikoro, an island of the Santa Cruz group in the southwestern Pacific. The next expedition to set foot on California soil was led by Alessandro Malaspina, an Italian in the employ of Spain, commanding the corvettes *Descubierta* and *Atrevida* (McKelvey 1955). Two botanists were assigned to Malaspina, Luis Née, who was French by birth but Spanish by choice, and Tadeáš Haenke, a Czech. Haenke failed to arrive at Cádiz in time to sail with the expedition, but by taking the next available ship to Montevideo and crossing South America overland, he was able to join his fellow explorers in Chile in 1790. Leaving Valparaíso, the expedition stopped at Callao, Trujillo, Guayaquil, Panamá, and Acapulco. From Acapulco it headed for Alaska, reaching Prince William Sound before turning south to California by way of Nootka Sound, British Columbia. Remaining at Monterey during the period 13–23 September 1791, Malaspina and his ships returned to Acapulco, whence they sailed across the Pacific to Guam

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and Manila. On the return voyage, they stopped in New Zealand, New South Wales, and Tonga before anchoring at Callao in 1793. At Callao, Haenke left the expedition, living the remainder of his life mostly in Cochabamba, Bolivia.

Although the Malaspina expedition, unlike its French predecessor, was not ill-fated physically, its potential for scientific accomplishments was left unfulfilled through bureaucratic neglect (Barneby 1963). Née's collections (which, because he had remained in Acapulco, did not include any material from California), together with Malaspina's journal of the expedition, were sequestered in Madrid. Née (1801) described 16 new species of *Quercus,* including *Q. agrifolia* and *Q. lobata* from Monterey (based on specimens brought back to him by ship's officers), but otherwise his collections remained unworked. Haenke's collections were first stored in a warehouse in Cádiz, then sent to Prague, where they lay deteriorating until salvaged by Count Kaspar von Sternberg, one of the founders of the Czech National Museum. Sternberg delegated responsibility for processing the Haenke collections to the Presl brothers, Jan and Karel. The algae were sent to the leading phycologist of that time, Carl Adolf Agardh in Lund. The very small number of specimens of algae indicates that they were collected only incidentally. Agardh (1825) listed 28 species for the entire itinerary of the expedition. Two were said to have come from Chile, but the provenance of the remainder was indicated vaguely, uncertainly, erroneously, or not at all, reflecting the condition of the specimens and their labels at the time that Agardh received them.

During the period 1822–1825 C. Agardh described the following new taxa of algae on the basis of Haenke's collections:

Cystoseira australis C. Agardh 1825:8 [no locality given].

C. caudata C. Agardh 1825:8 [no locality given].

C. expansa C. Agardh 1824:290 ["In mari australi"]; 1825:8; *Blossevillea expansa* (C. Agardh) Trevisan 1845:64; *Sirophysalis (?) expansa* (C. Agardh) Kützing 1849:603; *Gongolaria expansa* (C. Agardh) Kuntze 1891:895; *Cystoseira osmundacea* (Turner) C. Agardh f. *expansa* (C. Agardh) Setch. in Collins et al. 1901: no. XLVIII.

C. geminata C. Agardh 1824:286 ["In mari australi"]; *Cystophyllum geminatum* (C. Agardh) J. Agardh 1848:232; *Sirophysalis geminata* (C. Agardh) Kützing 1849:602; *Cystoseira crassipes* (Turner) C. Agardh subsp. *geminata* (C. Agardh) Yu.E. Petrov 1966: 99.

C. tuberculata C. Agardh 1824:290 ["In mari australi"]; *Blossevillea tuberculata* (C. Agardh) Trevisan 1845:66; *Gongolaria tuberculata* (C. Agardh) Kuntze 1891:895.

Fucus compressus C. Agardh 1824:279 ["In mari australi"]; 1825:

9; *Fucodium compressum* J. Agardh 1848:204; *Ascophylla compressa* (J. Agardh) Kuntze 1891:884; *Pelvetia (?) compressa* (J. Agardh) De Toni 1895:216.

Grateloupia hystrix C. Agardh 1822:223 ["ad caput bonae spei?"]; 1825:9; *Chaetangium hystrix* (C. Agardh) Kützing 1849:793; *Gigartina hystrix* (C. Agardh) Setchell & Gardner 1933:295.

G. ornata (L.) C. Agardh [var.] β *crispa* C. Agardh 1822:223 [no locality given]; 1825:9; *Chaetangium crispum* (C. Agardh) J. Agardh 1849:89; *Rissoella crispa* (C. Agardh) J. Agardh 1851: 242.

Ptilota densa C. Agardh 1822:387 ["Ad caput bonae spei"]; 1825: 11; *Neoptilota densa* (C. Agardh) Kylin 1956:393.

Sphaerococcus canaliculatus C. Agardh 1822:260 ["Ad litora chilensia"]; 1825:10; *Chondrus canaliculatus* (C. Agardh) Greville 1830:lv; *Gigartina chilensis* D.H. Kim 1976:39.

S. punctatus C. Agardh 1822:332 ["In mari Australi, ad oras Chilenses"]; 1825:10.

S. sternbergii C. Agardh 1822:275 ["In mari Australi"]; 1825:10; *Gelidium sternbergii* (C. Agardh) Greville 1830:lviii; *Grateloupia sternbergii* (C. Agardh) J. Agardh 1847:10; *Prionitis sternbergii* (C. Agardh) J. Agardh 1851:190; *Zanardinula sternbergii* (C. Agardh) De Toni f. 1936:[8].

In addition, Jacob Georg Agardh described two new species based on specimens that he found in his father's herbarium without a collector's name, but which Kylin (1941:12, 16) strongly suspected (in one case) or was certain (in another case) of having been collected by Haenke. These two species are:

Callophyllis australis J. Agardh 1847:13, adnot. ["Mare australe"], non *C. australis* (Harv.) Kütz.; *C. obtusifolia* J. Agardh 1851: 297.

Phyllotylus australis J. Agardh 1847:9, adnot. ["Mar. Austral."]; *Prionitis australis* (J. Agardh) J. Agardh 1851:188.

Eventually, as the marine algal flora of California became known, it was possible to infer that certain of Haenke's collections were from Monterey. *Cystoseira expansa* was associated by J. Agardh (1848:226) with *C. douglasii* Harvey (1841:407), based on a collection from Monterey. This species, in turn, was considered a phenotypic variant of *C. osmundacea* by Setchell (in Collins et al. 1901: no. XLVIII). The latter species, which was described as *Fucus osmundaceus* by Turner (1809:91, pl. 105), was based on a collection made by Menzies at Trinidad, Humboldt Co., Calif., in 1793 during the Vancouver Expedition.

Kylin (1941) thought it probable that *Ptilota densa, Callophyllis*

obtusifolia, and *Phyllotylus australis* came from Monterey, but that *Grateloupia sternbergii* came from Acapulco. Parkinson (1980), after examining a specimen of *Grateloupia hystrix* housed at Prague, concluded that it was a cystocarpic scrap of a *Mastocarpus* (Petrocelidaceae, Gigartinales), probably *M. papillatus* (C. Agardh) Kütz. This species is common at Monterey. The remainder of the Haenke species have remained enigmatic.

In an attempt to explain these enigmas, I made a special effort to find Haenke's collections in the Agardh herbarium at Lund during a visit in 1975. A visit to the National Museum in Prague was scheduled for later that year, but was canceled because of my illness. In 1981, Dr. Jiří Soják and Miss Blanka Deylová of the National Museum in Prague kindly sent me, on loan, material representing four of the Haenke taxa, namely, *Cystoseira australis, Fucus compressus, Grateloupia ornata* [var.] β *crispa,* and *Ptilota densa.* The application of the following names has been determined.

Cystoseira australis

This name has been completely overlooked. It occurs neither in J. Agardh's monographic treatment of the brown algae (1848) nor in De Toni's *Sylloge algarum* (1895). C. Agardh described filiform branches, here and there vesiculose, ending in pinnate, torulose, filiform receptacles. The specimens at Prague (Fig. 1) and Lund show that Agardh chose the correct genus, even though he had only the tip of the fertile portion of a frond. Both specimens are accompanied by a small handwritten slip, "Regismontanae," which obviously is a translation into Latin of "Monterey." Fortified by this knowledge of the provenance of these specimens, I can say with certainty that they are referable to *Cystoseira osmundacea.*

Cystoseira tuberculata

The description of this species does not differ substantially from that of *C. australis.* It seems certain that Agardh wrote the manuscript for his contribution to Presl's book (C. Agardh 1825) prior to writing that for his own *Systema algarum* (1824) and that he changed his mind regarding the epithet of the species. Support for this reasoning is given by the specimen of *C. australis* in Lund (Agardh herbarium no. 985), which has a second label, bearing the name *Cystoseira australis,* but with the epithet crossed out and replaced by *tuberculata.* Because of the inverted sequence of publication of the two names, *C. australis* turns out to be an illegitimate substitute for *C. tuberculata,* which then becomes a taxonomic synonym of *C. osmundacea.*

FIG. 1. *Cystoseira australis* C. Agardh. Isotype (PR).

Cystoseira caudata

The fact that specimens bearing this name were not found either at Lund or at Prague coupled with my newly found knowledge of the *C. australis-C. tuberculata* pair of names led to the discovery that an identical relationship existed between *C. caudata* and *C. geminata.* The two descriptions are essentially the same. Again, *caudata* was the first epithet to be conceived, but the second to be published. Specimens of *C. geminata* in the Agardh herbarium (no. 867) are labeled without an indication of change of epithet. The lack of a label indicating "Regismontanae" is in agreement with the fact that *C. geminata* does not occur at Monterey. Haenke probably made his collection at Nootka Sound on the west coast of Vancouver Island.

Grateloupia ornata [var.] β *crispa*

Whereas *Grateloupia ornata* sensu C. Agardh (not *Fucus ornatus* L., which is referable to *Suhria* in the Gelidiaceae) is representative of *Nothogenia erinacea* (Turner) Parkinson (Papenfuss 1952; Par-

FIG. 2. *Grateloupia ornata* [var.] β *crispa* C. Agardh. Isotype (PR).

kinson 1983:609), [var.] β *crispa* is quite different. No annotation "Regismontanae" accompanies the specimen at Prague (Fig. 2), suggesting that Monterey was not the provenance. The specimen, which is abundantly spermatangial, does not agree completely with any California seaweed that I know. Its anatomy, general habit, and papillae suggest *Mastocarpus.*

Ptilota densa

In the protologue is written "Ad caput bonae spei. Specimina dederunt Desfontaines, & Com. de Sternberg". No specimen of this species from the Cape of Good Hope is currently in the Agardh herbarium. Noting, however, that a specimen of this species in the Agardh herbarium (no. 20101) bears the label "e coll. Haenkeana," Kylin (1941:99) assumed that it came from the Monterey Peninsula. That Kylin was correct is borne out by the discovery that the specimen at Prague is annotated "Regismontanae." The Prague specimen of *P. densa,* but not the specimen in the Agardh herbarium, was accompanied by a small piece of *Neoptilota hypnoides* (Harv.) Kylin.

Fucus compressus

Six morphologically indistinguishable specimens, indicated as having been collected by Haenke at "Regismontanae," are available

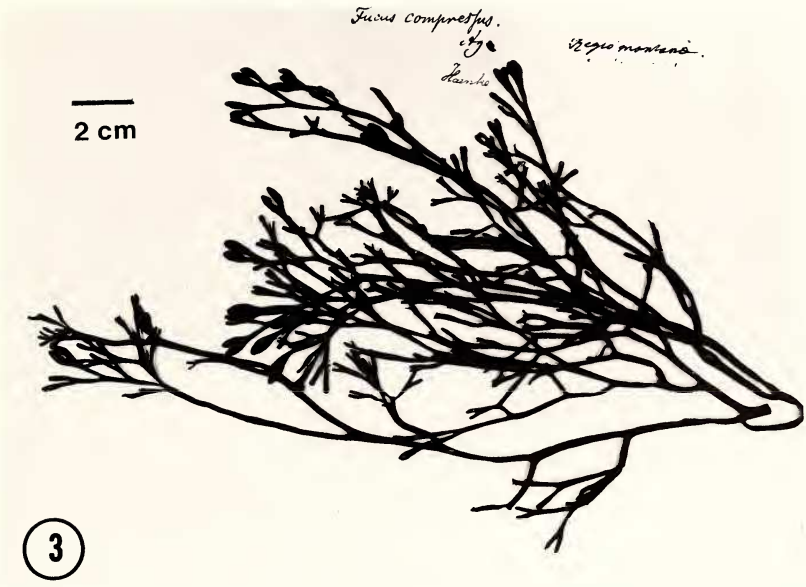

FIG. 3. *Fucus compressus* C. Agardh. Isotype (PR).

for this species. Five are in the Agardh herbarium, of which four are mounted on one sheet (no. 00093) and one is loose in a folder (no. 00094). The sixth is in Prague (Fig. 3). These specimens are in good condition and are unmistakably representative of the species currently called *Pelvetia fastigiata* (J. Agardh) De Toni. In view of the seniority of *Fucus compressus* C. Agardh (1824) over *F. fastigiatus* J. Agardh (1841), the intended basionym of *P. fastigiata,* it would seem that the correct name for this species would be *P. compressa.* The situation is complicated, however, by the fact that both of the intended basionyms are later homonyms (of *F. compressus* Esper 1799 and *F. fastigiatus* L. 1753, respectively), and hence are illegitimate and not priorable. The earliest legitimate name for each species was provided by J. Agardh (1848), who transferred both *F. compressus* and *F. fastigiatus* into his new genus *Fucodium.* Considering that the two basionyms (*Fucodium compressum* and *F. fastigiatum*) have the same date, it is appropriate to weigh other factors in deciding which name should be used.

At some time between 1831 and 1840, John Lindley, Professor of Botany at University College, London, and Assistant Secretary of the Horticultural Society of London, sent to J. Agardh some specimens collected in California in 1831 by David Douglas, a young botanical explorer in the service of the Horticultural Society. These

FIG. 4. *Fucus fastigiatus* J. Agardh. Holotype (Agardh herbarium no. 00066 in LD).

specimens were described as a new species, *Fucus fastigiatus,* by J. Agardh (1841:3), who noted that they were similar to those of *F. compressus,* but smaller and more fastigiate. In 1848 J. Agardh erected the genus *Fucodium* to encompass several previously described genera of Fucaceae that differed from *Fucus* in not having a midrib. The subsumed genera, each of which was treated as a section, were *Xiphophora* Mont. 1842, *Pelvetia* Decne. & Thur. 1845, *Pycnophycus* Kütz. 1843 (now known as *Bifurcaria* Stackh. 1809), and *Ozothallia* Decne. & Thur. 1845 (now known as *Ascophyllum* Stackh. 1809).

Fucodium sect. *Pelvetia* comprised three species: *F. canaliculatum* (L.) J. Agardh (*Fucus canaliculatus* L.), the type of *Pelvetia; F. compressum* J. Agardh; and *F. fastigiatum* J. Agardh. After *Pelvetia* had been reestablished at the generic level by various workers in the last half of the 19th century, De Toni (1895:214) brought all the species together for the first time.

Setchell's notebooks (in UC) do not indicate that he saw either the Haenke collection or the Douglas collection when he visited the Agardh herbarium in 1903. In 1957, however, while studying types of Pacific coast algae in the Agardh herbarium, I discovered that the Douglas collection (no. 00066) (Fig. 4) is representative, not of typ-

ical *P. fastigiata,* but of *P. fastigiata* f. *gracilis,* the slender, profusely branched form described by Setchell and Gardner (in Gardner 1917:386, based on *Gardner 2997* from Pebble Beach, Carmel Bay). It can safely be assumed that the Douglas collection was made at Pebble Beach, the only locality on the Monterey Peninsula where f. *gracilis* is known to occur.

Were it not for the existence of *Fucodium compressum,* we would be in the awkward position of having to apply the name *Pelvetia fastigiata* f. *fastigiata* to f. *gracilis,* thus creating confusion and at the same time leaving the common robust form without an infraspecific epithet. By applying *Fucodium compressum* to the species as a whole, *gracilis* can be retained as the epithet for the slender, profusely branched form from Pebble Beach. Of the two competing names for this species, therefore, I choose *Pelvetia compressa* (J. Agardh) De Toni, comprising *P. compressa* f. *compressa* and *P. compressa* f. *gracilis* (Setch. & N.L. Gardner) Silva, comb. nov. (basionym = *P. fastigiata* f. *gracilis* Setch. & N.L. Gardner in Gardner 1917:386).

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